Homogenization of plant communities across Mediterranean Regions: the case of Spanish and Californian grasslands

Javier Galán[1] (javier.galan@ebd.csic.es), Enrique García[2], Maria José Leiva[3], Ingrid M. Parker[4], Montserrat Vilà[1] (montse.vila@ebd.csic.es)

[1]Estación Biológica de Doñana (EBD-CSIC), Seville, Spain;
[2]Department of Ecology, Brandenburg University of Technology, Cottbus, Germany;
[3]Department of Plant Biology and Ecology, University of Seville, Seville, Spain;
[4]Department of Ecology and Evolutionary Biology, University of California, Santa Cruz, CA, U.S.A.

BACKGROUND

The introduction of exotic species is causing biodiversity loss and taxonomic homogenization worldwide.

Biogeographical comparisons of exotic species in their native and introduced ranges allow to understand to what extend invaded communities resemble donor communities [1].

The Mediterranean Biome constitutes a good study system because all Mediterranean Climate Regions are dominated by species native to the Mediterranean Basin [2].

In California, the introduction of exotic species started in the 16th century with the arrival of the first Spanish settlements along with the European agrarian culture. Currently, two-thirds of the 975 exotic plant species registered in California are native to the Mediterranean Basin [3].

QUESTIONS

- Do invaded communities in the introduced range (California) have a similar structure than donor communities in the native range (Spain)?
- Are exotic species more dominant in communities of the introduced range than donor communities in the native range?

METHODS

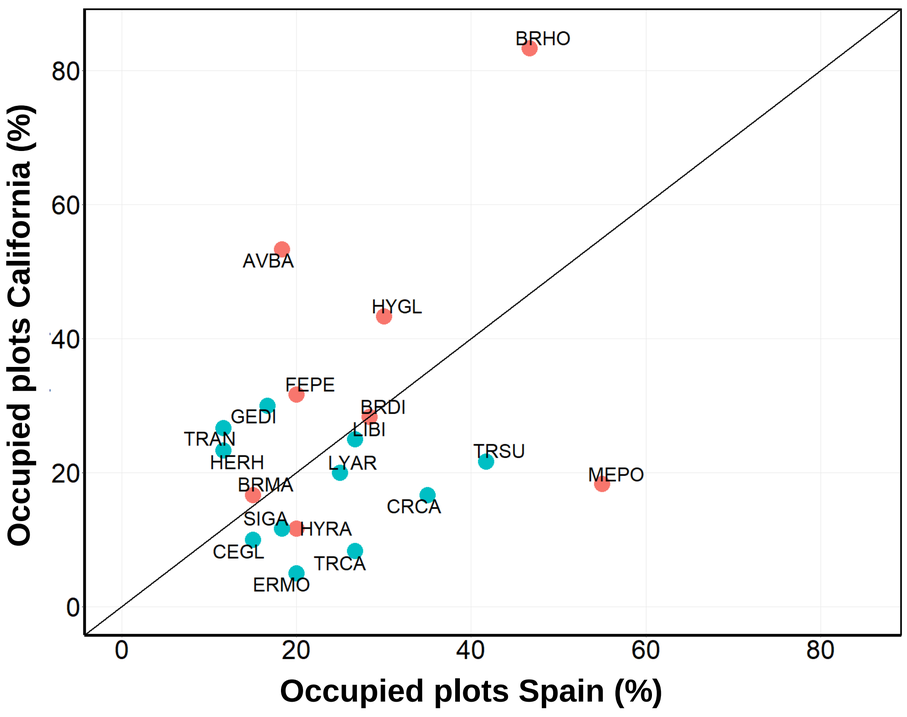
Surveys of plant species composition and abundance in grassland plots across eight sites with similar management histories and disturbance regimes in California and Spain.

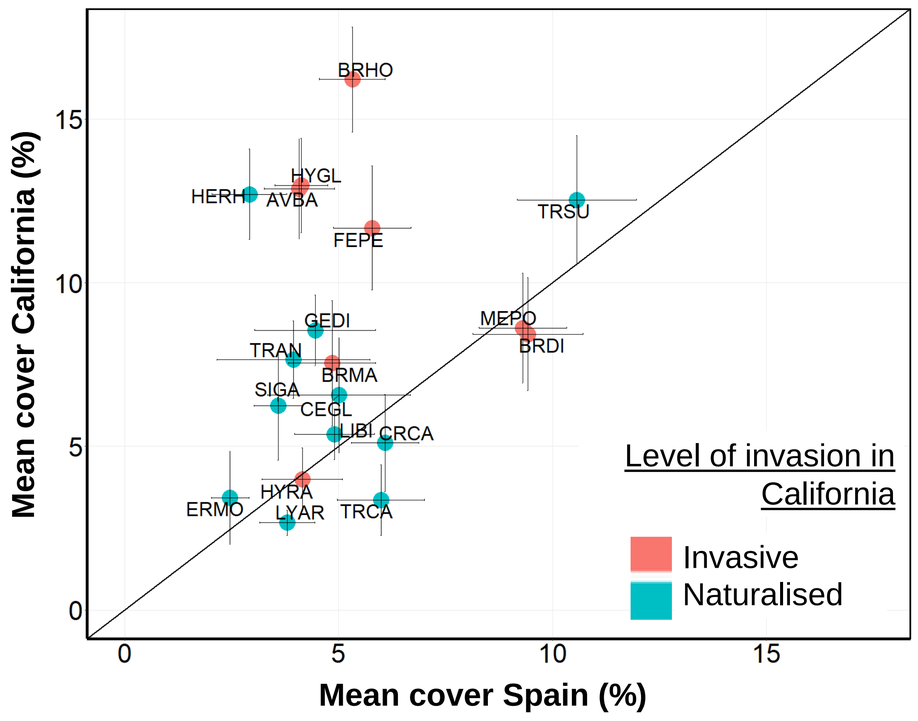
RESULTS

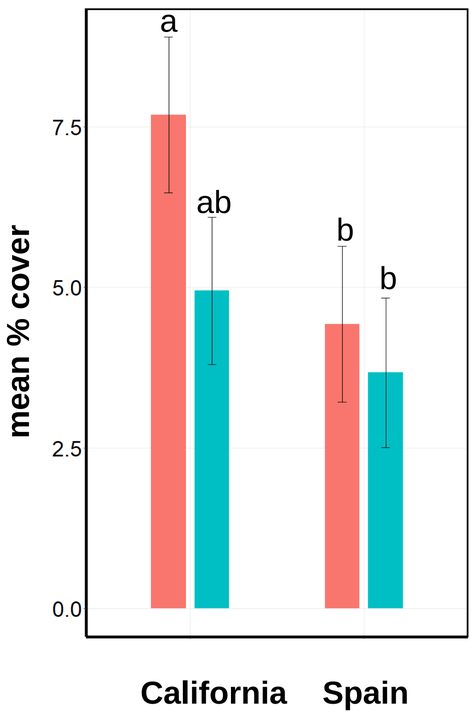
- In Spain, we found 139 native species and none exotic. In California, we found 52 native species and 46 exotics, all of them native to Europe.
- Spanish communities were richer and more diverse than Californian communities as a consequence of greater richness of native exclusive species.
- Cover of exotic species was greater in Californian than in Spanish communities.
- In both regions, there were in average five more exotic species per plot than natives.

		p	California (introduced range)	Spain (native range)
Shannon Index		**0.007**	2.09 ± 0.07	2.51 ± 0.11
Mean cover exotics (%)		0.05	81.14 ± 10.84	61.69 ± 11.21
Richness	Total	**<0.001**	11.05 ± 1.05	16.65 ± 1.07
	Natives	**0.01**	2.62 ± 1.25	5.69 ± 1.36
	Exotics	0.08	7.53 ± 1.13	10.71 ± 1.20

- Naturalised species (exotic non-pests) maintain their abundances across regions. Invasive species (pests) are significantly more abundant in the introduced range in California.







CONCLUSIONS

- European species introduced in California dominate both their native and recipient grassland communities in terms of richness.
- The abundance of exotic species in the native communities informs about the minimum abundance in the recipient communities.
- These exotic species were simultaneously introduced in America with agricultural practices that had been traditionally in place in Europe. Therefore, preadaptation to the European agrarian culture might explain their success in the introduced region.

REFERENCES

[1] Firn J, Moore JL, MacDougall AS, et al (2011). Abundance of introduced species at home predicts abundance away in herbaceous communities. Ecol Lett 14:274–281.

[2] Casado MA, Martín-Forés I, Castro I, et al (2018). Asymmetric flows and drivers of herbaceous plant invasion success among Mediterranean-climate regions. Sci Rep 8:16834.

[3] Rejmánek M, Randall J (1994). Invasive alien plants in California: 1993 summary and comparison with other areas in North America. Madroño 161–177

H2020: Marie Skłodowska-Curie No. 713673.
LCF/BQ/DI17/11620012